

# User Guide to Standard Plans

## Section ES – ELECTRICAL SYSTEMS – Poles, Posts, and Standards

<b>Standard Plan Numbers</b>	<p>ES-6A, ES-6B, ES-6C, ES-6D, ES-6E, ES-6F, ES-6G  ES-7A, ES-7B, ES-7C, ES-7D, ES-7E, ES-7F, ES-7G, ES-7H, ES-7J, ES-7K, ES-7L,  ES-7M, ES-7N, ES-7O, ES-7P, ES-7Q, ES-7R  ES-11  ES-16A, ES-16B, ES-16C, ES-16D</p> <p>Note that ES-14C deals with an overhead sign structure and is not covered by this user guide.</p>
<b>Implementation</b>	This user guide applies to the latest versions of Standard Plan Numbers above.
<b>Description of Component</b>	<p>Used for structural supports for</p> <ul style="list-style-type: none"> <li>• luminaires</li> <li>• signals</li> <li>• flashing beacons</li> <li>• CCTV</li> <li>• Vehicle detection system (VDS)</li> <li>• street name signs</li> <li>• push button assemblies and accessible pedestrian signals</li> <li>• certain other miscellaneous items.</li> </ul> <p>Also used for guard posts and pedestrian barricades</p> <p>Use inside or outside of Special Wind Regions. Use inside or outside of Ice Regions.</p>
<b>Standard Plan Features</b>	<p>The ES-6 Series include various structural supports for luminaires.</p> <p>ES-7A through ES-7L includes various structural supports for</p> <ul style="list-style-type: none"> <li>• Traffic Signals</li> <li>• Pedestrian Signals</li> <li>• Street Name Signs</li> <li>• Luminaires</li> <li>• Push Button Assemblies</li> <li>• Accessible Pedestrian Signals</li> <li>• Flashing Beacons</li> <li>• Certain associated sign panels</li> </ul> <p>ES-7M through ES-7O includes various general details and notes that apply to the ES-6 and ES-7 series.</p>

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<b>Standard Plan Features (continued)</b>	<p>ES-7P includes detailing for Internally Illuminated Street Name Signs</p> <p>ES-7Q includes guard posts and pedestrian barricades</p> <p>ES-7R includes details for miscellaneous attachments to structural supports for luminaires and traffic signals conforming to 2010 and later Standard Plans. Use of these details to attaching items to older supports and nonstandard supports should consider the ability of the structure to support the changes.</p> <p>ES-11 Includes additional foundation information that applies to most structures covered by this User Guide.</p> <p>ES-16A through ES-16C covers structural supports for CCTV systems.</p> <p>ES-16D covers structural supports for CCTV with VDS systems. Note that this sheet was intended to provide some flexibility for mounting of a variety of attachments within parameters given on the sheet.</p>
<b>Project Development Procedures</b>	<ul style="list-style-type: none"> <li>• Check for latest applicable version of Standard Plan(s) and SSP from <a href="http://www.dot.ca.gov/des/oe/construction-contract-standards.html">http://www.dot.ca.gov/des/oe/construction-contract-standards.html</a></li> <li>• Get the applicable version of this User Guide from <a href="http://des.onramp.dot.ca.gov/structure-policy-innovation/signs-overhead-structures">http://des.onramp.dot.ca.gov/structure-policy-innovation/signs-overhead-structures</a></li> <li>• Check for other documents that might apply. Some examples are: <ul style="list-style-type: none"> <li>○ Ramp Metering Design Manual</li> <li>○ California MUTCD</li> <li>○ Traffic Manual</li> </ul> </li> <li>• Verify that the project conforms to Standard Plans, this User Guide, the specifications, and other requirements and determine which sheets are needed. <ul style="list-style-type: none"> <li>○ For questions on interpretation of the Standard Plans or the User Guide, contact the Senior Technical Specialist for Signs and Overhead Structures.</li> <li>○ For questions on the interpretation of the structural information in the Standard Specifications and Standard Special Provisions contact the Office of Structure Specification Research and Development.</li> </ul> </li> </ul> <p>If elements of the project do not conform, then a special design is needed.</p>

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<b>Design/General Notes</b>	<p>Structural Design Notes:</p> <ul style="list-style-type: none"> <li>• Design Specification: <ul style="list-style-type: none"> <li>○ AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, Sixth Edition (LTS-6) dated 2013.</li> </ul> </li> <li>• GROUP LOAD COMBINATIONS: <ul style="list-style-type: none"> <li>○ I Dead Load</li> <li>○ II Dead Load + Wind Load</li> <li>○ III Dead Load + 0.5 (Wind Load) + Ice Load</li> <li>○ IV Fatigue Load</li> </ul> </li> <li>• LOADING: <ul style="list-style-type: none"> <li>○ Wind Loading: <ul style="list-style-type: none"> <li>▪ 100 mph (3-second gust)</li> <li>▪ Combined height, exposure, and elevated terrain factor = 1.00</li> <li>▪ Importance factor, <math>I_r = 1.00</math> (50 year recurrence interval)</li> </ul> </li> <li>○ Ice Loading: <ul style="list-style-type: none"> <li>▪ 3.0 psf on surfaces, 0.60 in radial thickness of ice</li> </ul> </li> <li>○ Fatigue: LTS-6, Section 11 <ul style="list-style-type: none"> <li>▪ Galloping,</li> <li>▪ Natural Wind Gust,</li> <li>▪ Truck-Induced Gust</li> <li>▪ Yearly Mean Wind Velocity (15.6 mph)</li> <li>▪ Fatigue Importance factor, <math>I_F = 1.0</math></li> </ul> </li> </ul> </li> <li>• MATERIAL PROPERTIES: <ul style="list-style-type: none"> <li>○ Structural Steel: <ul style="list-style-type: none"> <li>▪ <math>f_y = 55,000</math> psi (tapered steel tubes and anchor bolts)</li> <li>▪ Other plates, bars, hot rolled open shapes, <math>f_y = 50,000</math> psi</li> <li>▪ Weld Filler Metal, <math>F_u = 70,000</math> psi</li> <li>▪ Anchor Bolts: ASTM F1554 Grade 55</li> <li>▪ HS Anchor Bolts for Slip Bases: ASTM F1554 Grade 105</li> <li>▪ HS Cap Screws: ASTM A325</li> </ul> </li> <li>○ Reinforced Concrete: <ul style="list-style-type: none"> <li>▪ <math>f'_c = 3,600</math> psi</li> <li>▪ <math>f_y = 60,000</math> psi</li> </ul> </li> </ul> </li> </ul>
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<b>Foundation Design</b>	<p>CIDH Foundation Design (Broms' Method in LTS-6 Section 13):</p> <ul style="list-style-type: none"> <li>• Overload Factor = 2</li> <li>• Undercapacity Factor = 0.7</li> <li>• Cohesionless Soil Method <ul style="list-style-type: none"> <li>○ Soil unit weight, <math>\lambda</math> = 120 pcf</li> <li>○ Friction angle, <math>\phi</math> = 30°</li> </ul> </li> <li>• Cohesive Soil Method <ul style="list-style-type: none"> <li>○ Shear strength, <math>c</math> = 1500 psf</li> </ul> </li> <li>• CIDH length was also checked for torsion resistance following the Florida Department of Transportation (FDOT) modifications to section 13.6.1.1 of LTS-6 <ul style="list-style-type: none"> <li>○ Friction coefficient between shaft and soil, <math>\mu</math> = 0.3</li> </ul> </li> </ul>
<b>Additional Drawings Needed to Complete PS&amp;E</b>	<ul style="list-style-type: none"> <li>• Roadway and Electrical plans showing various other related info.</li> <li>• Special designs where needed.</li> </ul>
<b>Contract Specifications</b>	<ul style="list-style-type: none"> <li>• Standard Specifications.</li> <li>• Revised Standard Specifications</li> <li>• Standard Special Provision (SSP) from <a href="http://www.dot.ca.gov/des/oe/construction-contract-standards.html">http://www.dot.ca.gov/des/oe/construction-contract-standards.html</a></li> </ul>
<b>Restrictions on Use of Standard Drawings</b>	<p>If project conditions require significant deviations from these standards, the design might require a special design. Some examples might be:</p> <ul style="list-style-type: none"> <li>• Additional loads not shown</li> <li>• Additional holes or welding not shown</li> <li>• Deviations from dimensions (but see Other User Options below)</li> <li>• Soils not meeting minimum properties shown in "Foundation Design"</li> <li>• Locations where finish grade at base of standards is more than 33' above surrounding terrain</li> </ul>
<b>Other User Options</b>	<p>For traffic signal structures on ES-7C, ES-7D, ES-7E, ES-7F, ES-7G, and ES-7H that include a luminaire mast arm, the luminaire mast arm may be oriented in a plan direction other than parallel with the signal mast arm. Include information in contract documents to clearly indicate which structures will have a different luminaire mast arm direction and what the direction is to be.</p>